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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/628,514	07/29/2003	Berthold Wedding	Q76439	5092

23373 7590 08/10/2006

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EXAMINER	
PAYNE, DAVID C	
ART UNIT	**PAPER NUMBER**
2613	

DATE MAILED: 08/10/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/628,514	Applicant(s) WEDDING, BERTHOLD	
	Examiner David C. Payne	Art Unit 2613	

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 July 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-12* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-12* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *29 July 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

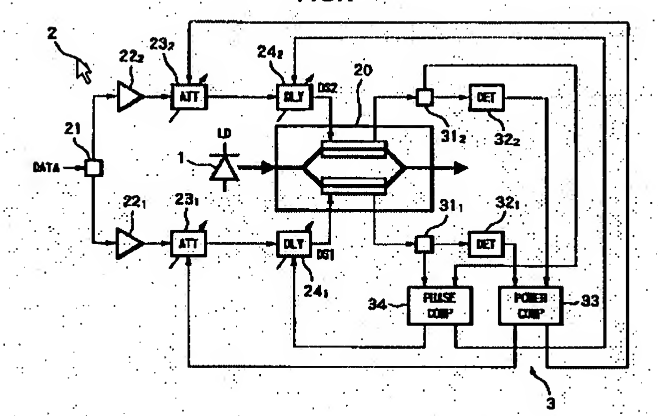
Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claim 1-12 are rejected under 35 U.S.C. 102(e) as being anticipated by Nakamoto US 6407845 B2 (Nakamoto).

FIG.1



Re claims 1-12, Nakamoto disclosed,

In FIG. 1, the present optical transmitter comprises a light source (LD) 1, a Mach-Zehnder type optical modulator 2 for externally modulating the light from the light source 1, and a chirp controlling circuit 3 for controlling a chirp to be added to an optical signal modulated by the Mach-Zehnder type optical modulator 2.

The light source 1 is a typical one for generating light of a required wavelength band such as by using a laser diode. The light generated by the light source 1 is kept in a predetermined polarized state such that a modulation efficiency at the Mach-Zehnder type optical modulator 2 is maximized and transmitted to a light input end 20A of the Mach-Zehnder type optical modulator 2.

The Mach-Zehnder type optical modulator 2 includes, for example, a substrate part 20, a branch circuit 21, driving circuits 22.sub.1, 22.sub.2, variable attenuators (ATT) 23.sub.1, 23.sub.2 as amplitude adjusting parts; and variable delay circuits (DLY) 24.sub.1, 24.sub.2 as phase adjusting parts. (e.g. Col./Line: 5-60-67 6/1-10)

In the present optical transmitter, CW light generated by the light source 1 is externally modulated by the Mach-Zehnder type optical modulator 2. This Mach-Zehnder type optical modulator 2 is applied with the first and second drive signals DS1, DS2 to the electrodes 20D.sub.1, 20D.sub.2 to thereby cause changes in the phases of respective lights propagated through the first and second arms 20B.sub.1, 20B.sub.2, respectively. A phase difference between the respective lights becomes 0 or .pi., resulted in an ON or OFF state of the light to be output from the light output end 20C. In this way, there is conducted an intensity modulation corresponding to the first and second drive signals DS1, DS2.

In the light modulation utilizing the Mach-Zehnder type optical modulator 2, there is essentially caused a wavelength change. Concretely, in one optical pulse modulated by the Mach-Zehnder type optical modulator 2, there is generated such a phenomenon called a red shift in which the wavelength shifts from a short wavelength (blue side) to a long wavelength (red side) with time lapse, or a phenomenon called blue shift in which the wavelength shifts from a long wavelength (red side) to a short wavelength (blue side) with time lapse. In the present optical transmitter, there is added a chirp to transmission light making use of the aforementioned wavelength change.

To add a required amount of chirp to an optical signal at the Mach-Zehnder type optical modulator 2, it is necessary to suitably adjust an amplitude ratio and the phase relation between the first and second drive signals. The amplitude ratio between the first and second drive signals shall be firstly considered. For example, when a required chirp amount is .alpha., if the optimum driving voltage is set as V.pi. assuming that the Mach-Zehnder type optical modulator 2 is to be driven by only one of the driving electrodes, a voltage V1 of the first drive signal and a voltage V2 of the second drive signal can be represented as follows:

V1=(1+.alpha.).multidot.V.pi./2,

and

V2=(1-.alpha.).multidot.V.pi./2.

Thus, the amplitude ratio between the first and second drive signals is determined corresponding to the optimum value of the chirp amount .alpha. to be set depending on power of the optical signal to be transmitted and on wavelength dispersion of a transmission path. In this embodiment, the aforementioned amplitude ratio corresponding to the optimum value of the chirp amount .alpha. is previously set in the electric power comparison circuit 33, and the amplitudes (voltages) of the first and second drive signals are feedback controlled by adjusting the attenuation amounts of the variable attenuators 23.sub.1, 23.sub.2 so that the optimum chirp amount is added to the optical signal. Note, in feedback controlling these amplitudes, there shall be simultaneously conducted at the electric power comparison circuit 33 such a control that a sum of electric powers detected by the electric power detectors 32.sub.1, 32.sub.2 becomes a value corresponding to the optimum driving voltage V.pi. in case of driving by only one of the electrodes as described above.

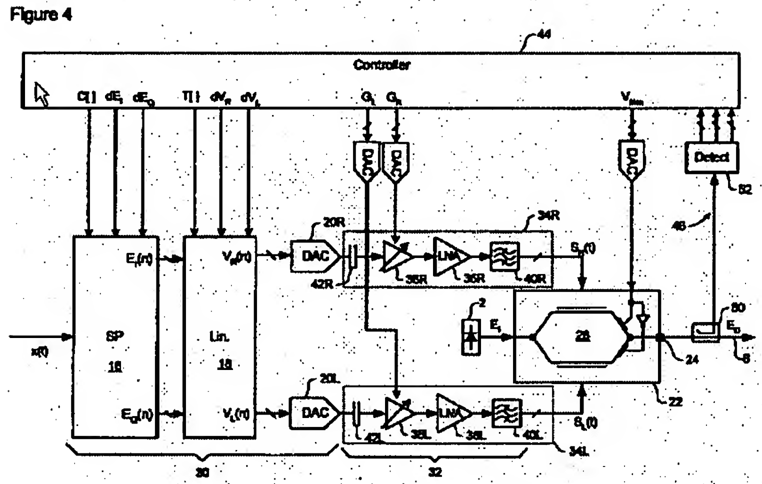
Further, the phase relation between the first and second drive signals is adjusted such that the phases of the first and second drive signals DS1, DS2 advancing through the electrodes 20D.sub.1, 20D.sub.2, respectively, are brought into an antiphase relation. Here, the phases of the first and second drive signals DS1, DS2 output from the output terminals P1.sub.OUT, P2.sub.OUT of the electrodes 20D.sub.1, 20D.sub.2 are compared with each other by the phase comparison circuit 34, and the phases of the first and second drive signals are feedback controlled by adjusting the delay amounts of the variable delay circuits 24.sub.1, 24.sub.2 so as to keep the antiphase relation.

Concretely, for example, the delay amounts of the variable delay circuits 24.sub.1, 24.sub.2 may be adjusted so as to obtain a computation result corresponding to 1 (one) time slot of a data signal, by computing a logical product of both drive signals after logically inverting one of the two drive signals to be input into the phase comparison circuit 34. As a concrete setting condition of this phase control, it is preferable to conduct feedback controlling so that the phases of the first and second drive signals DS1, DS2 are brought into an antiphase relation within a range less than 10% for 1 time slot of data.

According to the first embodiment as described above, the amplitudes and phases of the first and second drive signals DS1, DS2 are monitored and feedback controlled, to thereby enable realization of the optical transmitter capable of readily adjusting the chirp amount to the optimum value. (e.g. Col./Line: 7/40-67, 8/1-60)

3. Claim 1-12 are rejected under 35 U.S.C. 102(e) as being anticipated by Harley et al. US 2006/0127104 A1 (Harley).

Figure 4



Re claims 1-12, Harley disclosed,

[0041] In the embodiment of FIG. 4, the E/O converter 22 is provided by a dual branch Mach-Zehnder (MZ) interferometer 26. Each branch 28x of the MZ interferometer 26 is independently driven by a respective one of the branch drive signals S.sub.x(t). The E/O converter 22 also includes a respective direct-current (DC) input port which supplies a bias signal to its respective MZ interferometer.

[0042] It will be appreciated that the arrangement illustrated in FIG. 4 is suitable for implementing accurate synthesis of a desired output optical signal having a single polarization direction. However, the skilled artisan will recognise that this architecture can readily be extended to provide accurate optical synthesis in two orthogonal polarization directions. In a simple example, the entire signal path can be duplicated and run in parallel, with each signal path controlling a respective polarization direction. A preferred option, however, would be to utilize a single high speed digital stage 30 to compute digital drive signals V.sub.x(n) for both polarization directions. This enables the signal processor 16 and linearizer 18 to also control the polarization state of the output optical signal

E.sub.O(t), which facilitates compensation of, for example, polarization mode dispersion and polarization dependent loss.

[0043] As shown in FIG. 4, a control system in accordance with an embodiment of the present invention comprises a controller unit 44, and a feedback path 46 which samples the optical signal E.sub.O(t) at the E/O converter output 24. In operation, the controller unit 44, which may be provided as any suitable combination of hardware and software, implements a set of parallel control loops for controlling a variety of parameters of the signal path, such as: the target optical E-field (via the compensation function C[ ]); the digital drive signals (via the linearizer transfer function T[ ]), RF stage path gain (via the VGAs), and E/O converter bias. Each control loop involves injecting one or more dither signals into the signal path; detecting artefacts of these dither signals within the output optical signal E.sub.O(t); using the detected artefacts to compute one or more cost-function values that are indicative of an error between the target E-field and the actual E-field of the output optical signal; and, based on the results of the cost-function calculations, adjusting one or more parameters of the signal path so as to optimize transmitter performance, and thereby minimize the error.

[0044] As shown in FIG. 4, the feedback path 4b comprises an optical coupler 50, such as a conventional 20 dB coupler for sampling the output optical signal, and a detector block 52 for detecting predetermined artefacts within the sampled optical signal. As may be seen in FIG. 5, the detector block 52 includes a P-Intrinsic-N (PIN) diode 54 which emits a current I.sub.PIN that is proportional to a power level of the sampled optical signal. The PIN diode output is sampled by an Analog-to-Digital A/D converter 56, and the sample values supplied to a set of normalized correlators 58, each of which is controlled, in a manner known in the art, to detect signal components of a respective predetermined frequency. The output of each normalized correlator 58 is proportional to the power level of the detected signal components, and is supplied to the controller unit 44. (e.g. paragraphs 41-43)

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David C. Payne whose telephone number is (571) 272-3024. The examiner can normally be reached on M-F, 7:00a - 4:30p.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on (571) 272-3022. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Dcp

David C. Payne

David C. Payne
Primary Examiner
AU 2613